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THE FIRST ANNUAL CONFERENCE ON  
OPTICAL STORAGE FOR SMALL SYSTEMS  
JUNE 5-7, 1985

Information Storage Inc.

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OPTICAL MASS STORAGE FOR SMALL COMPUTER SYSTEMS:  
ISI's PHILOSOPHY AND PRODUCTS

BY

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INFORMATION STORAGE INC.

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TECHNOLOGY
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## I. INTRODUCTION

### A. ISI'S BUSINESS PHILOSOPHY

- 1) QUANTIFIABLE MARKET SIZE AND NEED MUST DRIVE PRODUCT DEVELOPMENT
- 2) OUR MARKET IS BUSINESS AND PROFESSIONAL USERS OF SMALL COMPUTER SYSTEMS
- 3) WE ARE SELLING NEW BUSINESS OPPORTUNITIES AND SOLUTIONS TO INFORMATION INTEGRITY, PRESERVATION, AND DISTRIBUTION OPPORTUNITY PROBLEMS -- NOT A TYPE OF TECHNOLOGY OR HARDWARE
- 4) OUR PRODUCTS MUST BE COMPATIBLE WITH THE MAINSTREAM OF SMALL COMPUTER SYSTEM USAGE

### B. THE IMPORTANCE OF WRITE-ONCE OPTICAL STORAGE SYSTEMS

- 1) HAS THE BEST FEATURES OF MAGNETIC DISK AND TAPE
- 2) PROVIDES SIMULTANEOUSLY BOTH ON-LINE DIRECTLY ACCESSIBLE AND PERMANENT, LOW-COST/MBYTE STORAGE ON A WRITABLE, REMOVABLE MEDIUM
- 3) PROVIDES REAL INFORMATION INTEGRITY
- 4) REPRESENTS A VERY IMPORTANT PRODUCTIVITY TOOL



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## II. THE APPLICATIONS SPECTRUM -- REAL AND IMAGINARY

- A. OPTICAL STORAGE OFFERS TODAY, AND WILL CONTINUE TO CREATE, NEW AND COST-EFFECTIVE OPPORTUNITIES FOR USING, DISTRIBUTING, AND PRESERVING AN ASSET OF RAPIDLY GROWING IMPORTANCE TO BUSINESS AND THE PROFESSIONS -- INFORMATION.
- B. WRITE-ONCE IS A VIRTUE, NOT A LIABILITY, IN THOSE APPLICATIONS WHERE THE VALUE OF THE INFORMATION STORED EXCEEDS THE COST OF THE STORAGE MEDIUM USED TO STORE IT.
- C. OPTICAL STORAGE, EVEN WHEN ERASABLE OPTICAL MEDIA ARE WIDELY AVAILABLE AND RELIABLE, IS NOT A ONE-FOR-ONE REPLACEMENT FOR EITHER MAGNETIC DISK OR TAPE STORAGE.
- D. NOT ALL STORAGE PROBLEMS WITH THE WORDS "MASS" AND/OR "ARCHIVAL" WRAPPED AROUND THEM REQUIRE OPTICAL STORAGE.



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### III. THE OEM MARKET IMPERATIVES

- A. RELIABILITY, RELIABILITY, RELIABILITY
- B. LOW UNIT COST--DRIVES AND MEDIA
- C. ABILITY TO MEET SCHEDULE AND VOLUME COMMITMENTS
- D. PERFORMANCE
  - 1) HIGH CAPACITY (50 MB TO 4 GB RANGE)
  - 2) HIGH DATA TRANSFER RATE (1 MBPS TO 10 MBPS RANGE)
  - 3) FAST ACCESS (< 100 MS AVERAGE)
- E. SECOND SOURCING--DRIVES AND MEDIA
- F. STANDARDS
  - 1) CONTROLLER
  - 2) MEDIA
  - 3) SOFTWARE
  - 4) FORM FACTOR
- G. WO/RM AND OROM MODES OF OPERATION NOW -- ERASABLE LATER



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#### IV. THE ISI DESIGN AND DEVELOPMENT PHILOSOPHY

- A. EMPHASIZE RELIABILITY, SIMPLICITY, AND MANUFACTURABILITY
- B. USE PROVEN COMPONENTS AND METHODS WHEREVER FEASIBLE --  
BUY, DON'T BUILD
- C. DESIGN IN SUBSTANTIAL MARGINS -- AVOID THE "CUTTING EDGE"
- D. PROVIDE A COMPATIBLE GROWTH PATH TO HIGHER PERFORMANCE  
LEVELS
- E. CREATE THE BUILDING BLOCKS REQUIRED FOR FULLY-INTEGRATED  
SYSTEMS AND SERVICES



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V. THE ISI 5-1/4" OPTICAL DISK DRIVE FAMILY

A. FULL AND HALF HEIGHT 5-1/4" FORM FACTOR OPTICAL DISK DRIVES

B. PERFORMANCE RANGE GOALS

- O CAPACITY : 100 MB - 400 MB  
(FORMATTED AND CERTIFIED)
- O AVERAGE ACCESS TIME : 50 MS - 200 MS
- O DATA TRANSFER RATE : 2.5 MBPS - 10 MBPS

C. WRITE-ONCE NOW, ERASABLE LATER

D. SPECIFICATIONS FOR THE FIRST MEMBER OF THE FAMILY, THE 525 WC:

(SEE NEXT PAGE)





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V. (CONT.)

## ISI's OPTICAL DISK DRIVE

THE 525 WC

- O DESIGNED FOR SINGLE-USER BUSINESS AND PROFESSIONAL SYSTEMS  
-- DESKTOP COMPUTERS, WORKSTATIONS, AND OFFICE AUTOMATION  
TERMINALS
- O PROVIDES SIMULTANEOUSLY BOTH ON-LINE, DIRECTLY-ACCESSIBLE  
AND ARCHIVAL, LOW COST/MEGABYTE STORAGE
- O COMES IN STANDARD 5-1/4" FULL HEIGHT FORM FACTOR AND WITH  
ESDI DRIVE INTERFACE (PC BUS AND SCSI CONTROLLERS  
AVAILABLE)

## \*\*\* KEY SPECIFICATIONS \*\*\*

FORMATTED AND CERTIFIED CAPACITY	100 MBYTES
DATA TRANSFER RATE	2.5 MBPS
AVERAGE ACCESS TIME	200MS (MAX.)
ROTATIONAL SPEED	1800 RPM
NUMBER OF USER TRACKS	14,900
NUMBER OF SECTORS/TRACK	32
USER DATA/SECTOR	256 BYTES
ERROR RATES	
- POSITIONING	10-6
- READ (WITH ISI CONTROLLER)	10-12
MTBF	15,000 HOURS
POWER REQUIREMENT	20 WATTS (MAX.)
ENVIRONMENT	
- AIR TEMPERATURE	60-90°F OPERATING
	50-110°F NON-OPERATING
- HUMIDITY	8-80%
WEIGHT	4.5 LBS.

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## VI. THE ISI SUPERSTORE 2000 OPTICAL DISK CARTRIDGE FAMILY

- A. 13-CM SINGLE AND DOUBLE SIDED WRITE-ONCE DISKS
- B. ALL DISKS FORMATTED AND CERTIFIED
- C. ALL DISKS PACKAGED IN A HARD-SHELL PLASTIC CARTRIDGE  
HAVING A STAINLESS STEEL SHUTTER AND WRITE-PROTECT SWITCH
- D. GOAL OF 100 MB - 200 MB OF USER DATA PER SURFACE
- E. SPECIFICATIONS FOR THE FIRST MEMBER OF THE FAMILY, THE  
SUPERSTORE 2000:

(SEE NEXT PAGE)



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VI. (CONT.)

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## ISI's OPTICAL DISK CARTRIDGE

### THE SUPERSTORE 2000

- O 100 - MILLION BYTES OF USER STORAGE\*
- O FULLY-ENCAPSULATED DATA STORAGE SURFACES
- O HARD-SHELL PLASTIC CARTRIDGE WITH WRITE PROTECT SWITCH
- O FORMATTED AND CERTIFIED  
(PROJECTED READ ERROR RATE OF  $10^{-12}$  AT END OF SERVICE LIFE)
- O 10-YEAR PROJECTED SERVICE LIFE UNDER ORDINARY ENVIRONMENTAL AND  
USAGE CONDITIONS
- O RETAIL PRICE GOAL OF < \$60
- O SOFTWARE AND DATABASES CAN BE PRE-WRITTEN
- O THE EQUIVALENT STORAGE OF 300 TYPICAL 5-1/4" FLOPPY DISKS AT LESS  
THAN 10% OF THE COST\*
- O LOWEST COST ON-LINE OR OFF-LINE 5-1/4" DATA STORAGE MEDIUM
- O A REMOVABLE DATA STORAGE MEDIUM OF EXCEPTIONAL RELIABILITY
- O A PRODUCT RESPONSIVE TO QUANTIFIED END USER REQUIREMENTS

\* THIS IS A GUARANTEED MINIMUM. CAPACITY OF PRODUCTION DISKS MAY BE AS HIGH AS 120MB. DOUBLE-SIDED DISKS MAY HAVE UP TO 240MB OF STORAGE.



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VII. THE ISI PRODUCT LINE -- THE SYSTEM IS THE SOLUTION

- A. COMPLETE OPTICAL MASS STORAGE SUBSYSTEMS FOR EITHER FRONT  
PANEL INTEGRATION OR ATTACHMENT
- B. COMPONENTS
  - 1) DRIVES
  - 2) MEDIA
  - 3) CONTROLLERS
  - 4) SOFTWARE
- C. SYSTEMS
  - 1) FRONT PANEL INTEGRATION KIT: DRIVE, CONTROLLER,  
SOFTWARE, AND CARTRIDGE
  - 2) ATTACHABLE SUBSYSTEM (OPTICAL STORAGE INTEGRATION  
SYSTEM): DRIVE, CONTROLLER, SOFTWARE, CABINET WITH  
POWER SUPPLY, INTERFACE CABLE, AND TWO CARTRIDGES



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VII. (CONT.)

ISI OPTICAL STORAGE INTEGRATION SYSTEM

- A. SIMPLIFIES EVALUATION AND DESIGN-IN FOR OEM'S
- B. MAKES VERTICAL APPLICATION DEVELOPMENT EASY
- C. A REAL, ATTACHABLE OPTICAL STORAGE SYSTEM - - -
  - O 525 WC OPTICAL DISK DRIVE
  - O SUPERSTORE 2000 OPTICAL DISK CARTRIDGES (2)
  - O PC/525 OPTICAL DRIVE CONTROLLER
  - O ISDOS SYSTEMS SOFTWARE
  - O CABINET WITH POWER SUPPLY
  - O INTERFACE CABLE
  - O DOCUMENTATION PACKAGE

WORKS WITH IBM PC'S OR TRUE COMPATIBLES  
USING MICROSOFT'S MS-DOS OPERATING SYSTEM



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VII. (CONT.)

SPECIAL FEATURES OF THE  
ISI 525 WC 5-1/4" OPTICAL DISK DRIVE AND SUESTORE 2000 CARTRIDGE

- |  |  |
|--|--|
| A. HIGH PERFORMANCE/<br>BALANCED PERFORMANCE | THE RESULT OF A MINIMUM OF 100 MBYTES OF ERROR-CORRECTED, ON-LINE USER STORAGE WITH WINCHESTER-LIKE DATA TRANSFER RATE AND ACCESS TIMES.   |
| B. HIGH RELIABILITY                          | THE RESULT OF CONSERVATIVE PERFORMANCE GOALS, PROPRIETARY SERVO SYSTEMS, ERROR DETECTION AND CORRECTION CODING, AND THE USE OF PROVEN COMPONENTS.                                      |
| C. LOW COST                                  | THE RESULT OF A SIMPLE DESIGN AND STANDARD PACKAGING AIMED AT VOLUME PRODUCTION.   |
| D. SECURE, REMOVABLE STORAGE                 | THE RESULT OF THE SUPERSTORE 2000 OPTICAL DISK CARTRIDGE DESIGN THAT FEATURES ENCAPSULATED DATA SURFACES, IMBEDDED SERVO DATA, A HARD-SHELL PLASTIC CARTRIDGE, AND FULL CERTIFICATION. |
| E. FLEXIBILITY                               | THE RESULT OF VARIOUS MODES OF OPERATION<br>- WORM, OROM, OR COMBINATION<br>- SERIAL OR RANDOM READ<br>- ON-LINE OR ARCHIVAL STORAGE<br>- PARTITIONED STORAGE WITH RAPID ACCESS        |



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VII. (CONT.)

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## BENEFITS OF ISI's 5-1/4" OPTICAL STORAGE SYSTEMS

- A. HIGH CAPACITY -- ON-LINE AND OFF-LINE
- B. HIGH RELIABILITY
  - 1) NO HEAD CRASHES
  - 2) ERROR DETECTION AND CORRECTION
  - 3) PROVEN COMPONENTS
- C. HIGH PERFORMANCE -- COMPARABLE TO 10MB HARD DISK DRIVES
- D. REMOVABLE DISK CARTRIDGE -- IDEAL FOR BACKUP, ARCHIVING, AND DATA TRANSPORT
- E. LOW UNIT COST FOR BOTH DRIVES AND DISKS
- F. COMPLEMENTS THE STORAGE CHARACTERISTICS OF HARD DISK AND TAPE DRIVES --  
ADDS A NEW DIMENSION TO MASS STORAGE
- G. IMPROVES THE PERFORMANCE OF HARD DISK DRIVES BY OFF-LOADING INFREQUENTLY USED  
OR READ-ONLY FILES, DATABASES, AND SOFTWARE
- H. PERMITS THE DESIGN-IN OF LOW-CAPACITY, HIGH-THROUGHPUT, MORE RELIABLE, AND LESS EXPENSIVE HARD DISK DRIVES -- ENDS THE PRESSURE TO ADD EVER LARGER HARD DISK DRIVES TO SINGLE USER SYSTEMS



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## VIII. THE FUTURE - REALIZING THE TRUE POTENTIAL OF OPTICAL STORAGE TECHNOLOGY

- A. PROVIDE MARKET LEADERSHIP
- B. DEVELOP PRODUCTS BASED ON RATIONAL MARKET NEED, NOT ON WHAT THE ULTIMATE CAPABILITY OF OPTICAL TECHNOLOGY MAY PROVIDE
- C. DEVELOP AND SUPPORT APPLICATIONS THAT EXPLOIT THE STRENGTHS AND BENEFITS OF OPTICAL TECHNOLOGY
- D. ESTABLISH BASIC STANDARDS
- E. COMMIT TO THE INDUSTRY AND END USERS





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IX. ABOUT ISI

- A. FOUNDED OCTOBER 1983 BY STEVE S. POPOVICH
- B. FINANCED BY R&D CONTRACTS/EQUITY PARTICIPATION TOTALING \$13.1 MILLION WITH CPT, SPERRY, AND TALLGRASS TECHNOLOGIES
- C. EXCEPTIONALLY STRONG MANAGEMENT AND ENGINEERING TEAM
- D. DEVELOPED FIRST FULLY-FUNCTIONAL 5-1/4" WRITE-ONCE OPTICAL STORAGE SYSTEM
- E. A FULLY-INTEGRATED OEM SUPPLIER OF OPTICAL STORAGE PRODUCTS FOR SMALL COMPUTER SYSTEMS
  - 1) OFF-SHORE MANUFACTURING FACILITY IN PLACE -- PRODUCTION RAMPUP BEGINS JULY 1985. PROJECTED 1986 CAPACITY OF 20,000 DRIVES PER MONTH
  - 2) EXCLUSIVE ARRANGEMENT WITH SUMITOMO CHEMICAL FOR OPTICAL DISKS -- PRODUCTION RAMPUP BEGINS IN AUGUST 1985. PROJECTED 1986 CAPACITY OF 100,000 DISKS PER MONTH
  - 3) INDEPENDENT VALUE-ADDED OPTICAL MEDIA COMPANY -- DIGITAL DATA DISK CORPORATION. WILL PROVIDE SUPERSTORE 2000 CARTRIDGES TO OEM CUSTOMERS AND RETAIL STORES AND SERVICES TO INFORMATION / DATABASE / SOFTWARE PUBLISHERS
  - 4) COLORADO SPRINGS HEADQUARTERS, R&D, AND SPECIAL SYSTEMS FACILITY BEING BUILT IN LOCAL AIRPORT FREE TRADE ZONE